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PAPERS
IN
AGRICULTURE.

No. I.

WARPING PEAT MOSS.

The ***Large Gold Medal*** *was this session presented to* ***Ralph Creyke****, Jun., Esq., of Rawcliffe House, near Thorne, Yorkshire, for warping* 429 *acres of Peat Moss.*

THE process of warping was first practised, it is said, about the middle of the last century, on some land in the neighbourhood of Howden, on the Humber. Not only the waters of the Humber itself, but the Trent, the Don, the Ouse, and other rivers which contribute to form that estuary, are, near their mouths (especially during spring tides) filled with very muddy water. This mud is not brought in from the sea, for the Humber is clear at its mouth; nor does it originate from land floods, for these are observed always to injure the *warp* or deposit; it therefore arises from the action of the tide water on the beds of soft shaly clay which form the bottom of the Lincolnshire marshes, and in which, in all probability, the estuary of the Humber has been excavated. All the embanked lands on these rivers being on a lower level than spring tides, are capable of being warped, which consists in surrounding the land intended to be so treated with a substantial bank, and then letting in the tide water, and allowing it to remain on the land till it has deposited nearly the whole of its mud. Thus the old soil is benefitted by the addition of new, or an entirely fresh soil is laid on the surface of the old, according to the thickness of the deposit, or the length of time that the warping is persevered in.

The usual mode of warping is to dig a main canal, or trunk, having a sluice towards the river, and to divide the lands on each side of the drain, by means of banks, into compartments of from ten to twenty acres each, and to make an entrance sluice to each compartment, together with one or more return sluices called *cloughs*. During the spring tides, in the months of August, September, and October, the sluice of the main trunk being opened, the tide water enters it, and is distributed by the lateral entrance sluices to as many of the compartments as may be convenient. When the tide is at its height, each of these entrance sluices is closed; and, as it ebbs, the hydrostatic pressure of the water in the compartments forces outwards the swinging door of the clough, and thus allows the water to escape into the main trunk, and thence into the river, having deposited nearly the whole of its mud on the surface of the inclosure in which it was penned up. The size of the cloughs should be so adjusted as to discharge the whole of the water before the rise of the next tide, otherwise only every other tide can be admitted. By this operation a deposit of silt, of the thickness of from twelve to sixteen inches, may be obtained in one season.

Mr. Creyke having ascertained that a tract of about 1600 acres of peat moss, in the neighbourhood of Rawcliffe, which produced absolutely no rent, was at a sufficiently low level to be warped, resolved to subject the whole to this mode of rendering it productive; the way in which this was effected is detailed in the following extracts from that gentleman's letters, addressed to the Secretary of the Society.

Rawcliffe Houſe, near Thorne, Yorkshire,
Sir, Nov. 18, 1824.

In the neighbourhood of Rawcliffe House, where I reside, are many thousand acres of peat moss and waste land, which yield scarcely any annual rent, and which I thought (from the experience I had got in improving a considerable quantity of my own land near home) might be improved very much by being warped. I accordingly undertook to warp from the river Ouse 1600 acres; and in August, 1821, a sluice, with two openings of sixteen feet each, and nineteen feet high from the sole to the crown of the arch, with substantial folding doors, was built and opened; and at the same time a main drain was cut, extending from it two miles and a half, up to the waste land and peat moss: its dimensions were thirty feet wide at the bottom, and ninety feet wide at the surface of the land,

and the banks were raised upon the land to the height of ten feet. The ordinary spring tides flow to the height of sixteen feet, where the sluice is built. In the first year 429 acres of waste land were embanked, in order to be improved; and on it was deposited, in the course of that year, a fine alluvial soil, of the average depth of near three feet. This allotment was sown with oats and seeds in 1823, and the seeds were either mown or depastured in 1824; and it is now sown with wheat, which looks very promising and luxuriant. No part of this allotment of 429 acres yielded any rent previous to this improvement, and now no part of it is let for less than thirty-five shillings per acre. The expense is twenty-one pounds per acre. I am proceeding with two other allotments, containing a greater number of acres in each, of which, when finished, I will send you an account, if this be honoured with the approbation of the Society.

I am, Sir,
&c. &c. &c.
RALPH CREYKE, Jun.

A. Aikin, Esq.
Secretary, &c. &c.

SIR, Rawcliffe House, March 24, 1825.

I BEG leave to acknowledge the receipt of your letter, dated 1st March. I trust that I shall be able to satisfy the committee that my claim for the large gold medal is strictly conformable to the terms for which they offer it, namely, "for an account of a method superior to any hitherto practised of improving land lying waste."

The superiority consists in creating a fine deep rich soil, more effectually, upon a larger scale, and in a shorter time, than has hitherto been practised. According to the usual practice, the tides were only admitted during the months of August, September, and October; in mine they are admitted the year round. The sluice was not more than five feet wide; mine has two openings of sixteen feet wide. The main drain was only twelve feet wide; mine is ninety feet wide. Not more than fourteen acres were embanked in one piece; I have inclosed five hundred acres in one compartment. Formerly not more than one and a half feet of deposit was obtained; I have got from three to four feet in the same time, upon the increased quantity of land. No levels used to be taken for the formation of the banks; the whole of my embankment has been laid out by the spirit level. Scarcely any inlets used to be made for the purpose of spreading the tide water quicker and more equally over the surface of the land within the embankment, as well as for the more speedy return of it upon the ebb; in my practice innumerable inlets are formed for this purpose. It is quite impossible to give a detailed account of the arrangement of these inlets; they must, in all cases, vary with the shape and different levels of the land embanked, and on that account no exact statement of cost can be given; it is, however, very considerable. The width of the inlets varies from fifty feet to three feet, the depth from seven feet to one foot.

There is much more difficulty in the interior management than any other part; the knowledge of it can only be acquired by practice and close observation. There is likewise a very considerable annual expense in the repairs of the main drain, more particularly of that part near the sluice. A loss of one thousand pounds was experienced the first year, owing to a breach of the bank of the main drain. In my first letter I named 429 acres, at that time growing a fine luxuriant crop of wheat: I now beg to add 500 acres more, at this moment in a state of preparation for being sown with oats and grass seeds this spring; and that 600 acres more will be finished in the course of the present year.

I am, Sir,
&c. &c. &c.
RALPH CREYKE, Jun.

A. Aikin, Esq.
Secretary, &c. &c.

Queries sent by the Secretary to Mr. Creyke, 1st March, 1825; with that Gentleman's Answers.

1. Expense of erecting the sluice, divided into labour and cost of materials; the nature of such materials, whether brick or stone?

The sluice is built of stone of large size, backed with brick; the foundation was well piled with 550 piles, thirteen feet long, squaring eleven inches, upon which were firmly secured very strong beams; upon the beams the whole space upon which the sluice was built was planked with four-inch deals, another set of beams were placed crossways, and then a second floor of three-inch plank. Sleeting piles were driven the whole length of the wood work, both fronting the river and next the main drain; a wall is also erected from the sluice to the river, to protect the bank from being injured. The cost of the sluice,

£4,800; the cost of the wall, £300; £340 more for a residence, and stone for materials, for the person attending upon the tides, &c. &c.

2. Expense of the main drain?

The expense of the main drain, being three and a half miles long, was £7,350, exclusive of the purchase of the land, £4,682; the dimensions of it were ninety feet wide at the surface of the land, eleven and a half feet deep, and thirty feet wide at the bottom; at the width of nine feet from the edge of the main drain is placed the bank, the base of which is sixty feet, and the height ten feet; the bank is made as strong as possible by puddling. The main drain is used as a canal, and is found of great benefit to the lands adjoining.

3. Length, and other dimensions, and materials of the embankment to retain the water on the land to be warped, and cost of the same?

The length of the embankment to retain the tide-water must depend upon the quantity of land embanked; these banks must be well puddled, and made with the greatest care. The dimensions of our banks are thirty-two feet at the base, ten feet high, and six feet wide at the top. The cost of them, three shillings per floor of twenty poles.

4. Elevation of the peat moss above low water at neap tides?

The level of the peat moss varies very considerably; the lowest parts of it are not more than four feet above low water mark; the highest as much as thirteen feet above low water mark.

5. Did the peat undergo any operation of levelling, &c. previous to the water being let in upon it?

The peat moss will, in the first instance, settle very considerably, by the drainage produced by the cutting of the various inlets; and afterwards by the pressure of the soil deposited: it undergoes no levelling.

6. Was the water let on every spring tide, or how many tides? How long did it remain on the land? How long was it in flowing off the land before the next spring tide was admitted?

Every tide is admitted during the spring tides, and occasionally during the neap tides; care should, however, be taken not to admit any tides when it blows strong, as the banks are subject to great injury at those times, and the warp does not deposit, from the agitated state of the water, the water returns from the land with the ebb. In the river Ouse, at the point where the sluice is erected, the tides flow to their height in three hours, and ebb nine hours. The height is from eighteen feet to fourteen feet.

7. Are there any seasons of the year, or other circumstances, that affect the amount of the silt deposited?

The water in the river will at times be so much affected by land floods, in very rainy weather, that it is not worth admission; in dry weather the amount of silt is nearly the same; in the hotter months the proportion of salt in the silt is greater than at other times.

CERTIFICATE.

Saltmarshe, near Howden, Yorkshire.

We, the undersigned, two of his majesty's justices of the peace for the county of York, and residing in the neighbourhood of the peat moss and waste grounds alluded to in a letter from Ralph Creyke, Jun., Esq., to the Secretary to the Society for the Encouragement of Arts, &c. &c., dated 18th November, 1824, do certify, that we have seen the said peat moss frequently previous to the improvement by warping, at which time it was of little or no value, and produced no rent to the owners; that we have seen it since the warping was completed; that it is now in a state of cultivation, and capable of producing the most abundant crops of corn, grass, and every other kind of produce.

Given under our hands the 24th Nov. 1824.

PHILIP SALTMARSHE.
ROB. DENISON, Jun.